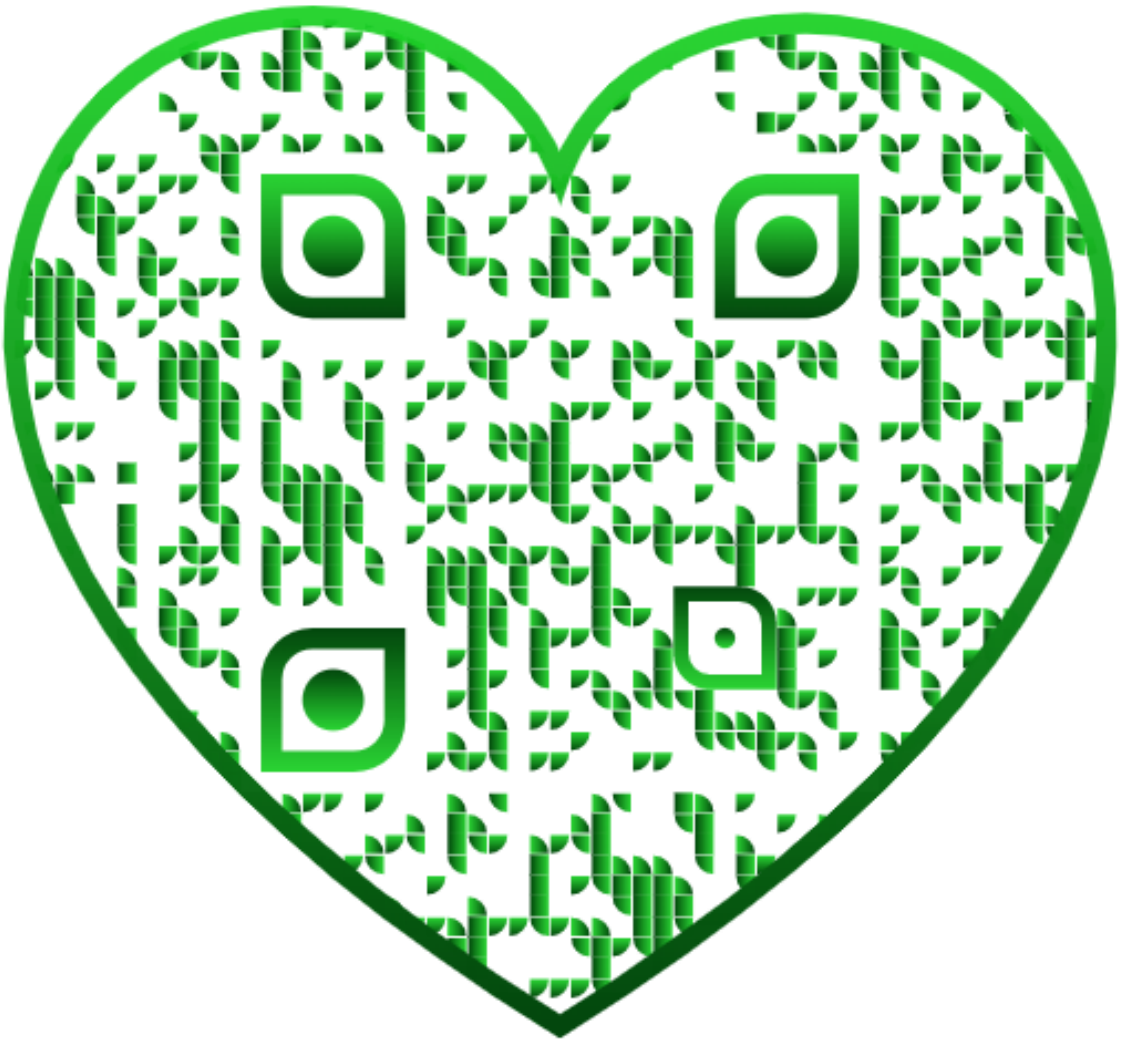
Fat soluble vitamins

MOHAMMED NOUR

vitamins	Active form & place of activation	functions	symptoms or diseses	causes of deficiency
A β-carotene	1)Retinol 2)Retinal 3)Retinoic acid - liver	1-Maintenance of reproduction vision 2-promotion of the growth 3-gene expression and cellular differentiation and maintenance, of epithelial tissues 4-reproduction, bone development and immune system ction 5-β-carotene is an antioxidant	1-Night blindness 2-xerophthalmia 3-keratinization of skin 4-retardation of growth 5-Impaired embryonic development, impaired spermatogenesis 6-Broken fingernails 7-dry scaly & rough of the skin	1-Decrease intake of Vitamin A in diet 2- Malabsorption of lipids 3- Zinc deficiency because it's essential for the synthesis of vit. A transport protein (retinol binding protein)
D Cholecalciferol Ergocalciferol	1) 1,25 dihydroxy-cholecalciferol. Or calcitriol or 1,25(OH)-D3. 2) 1,25 dihydroxy-ergocalciferol. Or ercalcitriol or 1,25(OH) D2. -Liver & kidney	1-Maintenance of calcium and phosphorus balance; enhances intestinal absorption of Ca2+ and mobilizes bone mineral 2-has role in calcification of bones & teeth by ↑synthesis of osteocalcin 3-Calcitriol has an unclear role in: a. Insulin secretion b. Synthesis & secretion of parathyroid & thyroid hormones c. Cell proliferation & growth. d. induces cell differentiation.	1-Rickets : poor mineralization of bone in children(soft & deformity bones, like deformities of legs) 2-osteomalacia = bone demineralization in adult (fragile bones, susceptible to fracture) -all these symptoms are due to lack of minerals.	1)↓ its intake in diet 2) Lipids Malabsorption 3) Inadequate exposure to sunlight 4) The risk of Vit. D def. ↑ in persons with: a. Dark skin b. Obesity c. Chronic Renal failure



K Antihemorrhage vitamin	1)vit k1:Phylloquinone 2)vit k2:Menaquinone 3)vit k3: Menadione -liver	1) It has a role in blood coagulation: Coenzyme in gama- carboxylation of glutamate residue in clotting process 2)It has a role in bone	bleeding (hemorrhage)	1) Malabsorption of lipids 2) Chronic treatment by antibiotics (antibiotic kills normal flora in intestine). 3) Liver diseases 4) Newborns are at risk for vit. K deficiency, because newborns lack the bacteria that synthesize vit. K & breast milk not contains enough amount of vit. K
E	α-Tocopherols	_Antioxidant, especially in cell membranes	_skeletal muscle pain, weakness & hemolytic anemia	_Malabsorption of lipids

Water soluble Vitamins

MOHAMMED NOUR

vitamins	Active form & place of activatio	functions	symptoms or diseses	causes of deficiency
B1 Thiamine Antiberiberi	Thiamine diphosphate (TDP)or Thiamine pyrophosphate(TPP) _liver, red cell and nerve tissues	1)TPP act as a coenzyme in CHO & protein metabolism and energy metabolism: a)Coenzyme for convert pyruvate to Acetyl CoA and α−ketoglutarate to succinyl CoA b)production of NADPH & acetyl CoA: has a role in lipid metabolism 2)TDP: coenzyme for amino acids catabolism 3)TTP has role in nerve impulse transmission	1) Dry beriberi 2) Wet beriberi 3) Infantile beriberi 4) Cerebral beriberi	1) Poor diet 2) Chronic alcoholism 3) Use of diuretics 4) Excessive diarrhea, vomiting or malabsorption
B2 Riboflavin	1) Flavin mononucleo-tide(FMN) 2)Flavin adenine dinucleotide(FAD)	Coenzyme in oxidation-reduction reactions; two H transfer. 1) FAD is required for: a) synthesis of niacin vitamin from the tryptophan b) convert retinol to retinoic acid c) reduction of the glutathione (GSSG) to its reduced form(GSH) e) synthesis of deoxyribonucleotides from ribonucleotides which are important in DNA synthesis. 2) FMN is required for activation of vit. B6 (pyridoxine → pyridoxal phosphate) 3) FADH2 required for synthesis of the active form of folate. One mole of FADH2 produce 2ATP	1)Chelosis (fissuring at the corners of the mouth & lips) 2)Glossitis (inflammation of the tongue lead to magenta tongue), 3)Tearing, burning & itching of the eyes 4)Photophobia 5)Corneal vascularization (bloodshot eyes) 6) Dermatitis	1) Inadequate intake 2) Malabsorption 3) Phototherapy for infants with hyperbilirubinemia

B3 Niacin , Nicotinic acid nicotinamide	1) Nicotinamide adenine dinucleotide (NAD+) 2) Nicotinamide adenine dinucleotide phosphate (NADP+) -liver	1)Coenzyme in oxidation-reduction reactions; two H transfer 2) NAD+ has a role in ADP-ribosylation(addition of ADP–ribose) for the proteins & for the DNA repair mechanism 3)treatment of lipid disorders -One mole of NADH2 produce 3 ATP when enter respiratory chain	1)Mild deficiency:muscular weakness, anorexia, indigestion, glossitis (bright red tongue) & depression 2)Sever deficiency:pellagra (called the 3Ds disease): Dermatitis, Diarrhea & Depression or Dementia	1) Inadequate intake 2) Malabsorption 3) Alcoholism (↓ B1 & B3 absorption) 4) Hartnup disease 5) Using antituberculosis drugs that inactivate B6 (necessary for niacin synthesis) 6) Excessive intake of leucine
B5 Pantothenic acid	Coenzyme A	_Functional part of CoA and acyl carrier. It is important in fatty acid synthesis and metabolism	1)Paresthesia(sensation of tingling) of the hands & feet may be defect in nerve function :due to defect in acetyl choline synthesis, impaired myelin synthes 2)Depression bcuase same1 3)Fatigue, insomina, & weakness	_It's rare, but it may appear in malnutrition condition
B6 Pyridoxine pyridoxal pyridoxamine	_pyridoxal phosphate (PLP) _liver, brain and other tissue	**a)act as a coenzyme for**: 1. transamination of amino acids 2. formation of niacin from trp 3.heme synthesis in formation of Hb 4.glycogen phosphorylase in muscle &liver which is breakdown of glycogen into G-1-Pduring fasting 5.converting homocysteine to cysteine **b) PLP Has a role in**: 1. regulation the action of steroid h. 2. synthesis of neurotransmitters, serotonin, epinephrine, & γ-aminobutyrate & histamine 3. biosynthesis of sphingolipids in myelin sheaths in nerve cells.	1) Weakness, 2) Sleeplessness (insomnia) 3) Peripheral neuropathy, 4)Cheilosis, glossitis & stomatitis 5)Convulsion in infants	_Its deficiency is rare

B7 Biotin (H vit.) Ani-egg white factor	bioyctin	1)Coenzyme in carboxylation reactionsfor converts pyruvate to oxaloacetate in gluconeogenesis and Acetyl CoA carboxylase in fatty acid synthesis 2) It has a role in gene Expression & Cell Signaling	1)Hair loss (alopecia) 2) dermatitis & depression 3) lethargy 4) hallucination & numbness 5) tingling of the extremities	1)Vit. B7 deficiency is rare 2)Eating raw eggs may lead to def. because eggs contain avidin that bind with biotin & prevent biotin absorption
Folic acid (vit.B9 or vit. B11)	Tetrahydrofolate (THF) -liver	a) Tetrahydrofolate (THF): transfer one-C group on the N-5 or N-10 position to other compounds. b) THF act as a coenzyme for: 1. Purines & pyrimidines 2. Converting homocysteine to methionine. 3. Converting glycine to serine. 4. Histidine catabolism 5. Glycine catabolism	1) Megaloblastic anemia due to decrease of DNA & RNA biosynthesis that reduce cell division in bone marrow 2) Its def. during pregnancy may lead to neural tube defects because it has a role in normal cell division during embryogenesis	1) low dietary intake 2) Using antifolate drugs 3) Increased demand as in leukemia or pregnancy 4) Malabsorption
B12 Cobalamin	1)Methylcobalamin 2)5-Deoxyadenosyl-cobalamin	1) Methylcobalamin act as a coenzyme for methionine synthase for converting homocysteine to methionine 2) Adenosylcobalamin act as a coenzyme for methyl malonyl CoA for converts L-methylmalonyl CoA to succinyl CoA	Neurologic & hematologic origin, megaloblastic (macrocytic) anemia,skin pallor, fatigue, shortness of breath, palpitations, insomnia, tingling & numbness (paresthesia) in extremities, loss of concentration, memory loss, demyelination of nerves, spinal cord degeneration	1) Gastroectomy 2) Gastric atrophy 3) Inadequate intake 4) Malabsorption 5) Achlorhydria 6) Autoimmune destruction of the gastric parietal cells

C Ascorbic acid	ascorbic acid	1) acts as a coenzyme for: a) hydroxylation of proline and acid lysine in collagen synthesis b)carnitine synthesis c) phenylalanine hydroxylase for synthesis of tyrosine e)neurotransmitters synhtesis 2)It has a role in absorption of iron in intestine by reduces ferric to ferrous 3)It has a role in bile acids, aldosterone & cortisol synthesis & in converting folate to THF 4)It acts as antioxidant 5) It has a role in immunity	1)Scurvy which characterized by bleeding gums, small red skin discolorations (petechiae), impaired wound & fracture healing, joint pain 2)Anemia may be due to decrease folate metabolism, iron absorption & also lead to bleeding 3)Fatigue may be due to decrease synthesis of carnitine which is important to produce energy from lipid	1)decrease vit. Intake 2)malabsorption

كل مصادر الفيتامينات حيواني و نباتي
باستثناء :

1) vit. B12 : animal
2) vit. D : anmial, fungi and sunlight